PATENT SPECIFICATION 1,134,069

DRAWINGS ATTACHED.

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1,134,069

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COMPLETE SPECIFICATION.

Apparatus for Dusting Tacky Materials.

We, H. W. WALLACE & CO. LIMITED, of 172, St. James's Road, Croydon, Surrey, a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:

The invention relates to apparatus for dusting tacky materials, such, for example, as extruded or calendered materials which are given a tacky or sticky surface during process of manufacture.

The tacky material may be dusted, for example, with talc or french chalk or other powder to prevent the material from sticking to itself when, for instance, it is wound on a reel or placed one sheet upon another.

Sometimes it is also necessary to powder the surface of unvulcanised or partially vulcanised rubber as it comes from the nozzle of an extruding machine prior to final vulcanisation in a heated fluid bed. The powder is applied in order to prevent the fluidised material of the bed, which may be small glass beads known as balatini or sand or similar granular material, from adhering to the surface of the extruded material.

Heretofore the powdering process has been either carried out by hand or by spraying the powder from a gun in a similar manner to paint spraying.

The object of the present invention is to provide an apparatus for applying dust to tacky or sticky materials of the kind above referred to automatically and with simple and inexpensive apparatus.

The invention consists in an apparatus for dusting tacky material comprising a first hollow vessel having an inlet aperture and an outlet aperture at opposite ends thereof for the passage therethrough of the material to be treated, a second hollow vessel connected from the upper part thereof by flow and return pipes to different parts of said first hollow vessel, means which induces a flow of air through the said pipes between the vessels, and elevator means within the second hollow vessel to raise powder in the vessel and allow it to fall so as to become entrained in the air passing through the said second hollow vessel.

The invention further consists in an apparatus as set forth in the preceding paragraph in which in the first hollow vessel a connection of the flow pipe is made adjacent the inlet aperture and a connection for the return pipe is made adjacent the outlet aperture.

The invention still further consists in apparatus as set forth above in which in the first hollow vessel a connection of the return pipe is made in the vicinity of each of the apertures, and the connection of the flow pipe is made to the vessel intermediate the apertures.

The invention still further consists in apparatus as set forth above in which the connections of the flow and return pipes to the first hollow vessel are each in the form of an annular slot encircling the path followed by the material as it passes through the vessel.

The invention still further consists in apparatus as set forth above in which the first hollow vessel is in the form of a box, the inlet and outlet apertures are in opposite ends of the box and adjacent the bottom thereof, the connections of the return pipe are in the top of the box adjacent the said ends, and the connection of the flow pipe is in one side of the box intermediate the ends and leads to a slotted distributor positioned between the sides of the box and across the path followed by the material and having outlets facing towards the bottom of the box and above the material passing through the box.

The drawings, of which Figures 1—4

[*Price* 4*s.* 6*d.*]

accompany the Provisional Specification and Figures 5—9 accompany the Complete Specification, show, by way of example only one embodiment of the invention in which

Figure 1 is a schematic perspective view of the apparatus.

Figure 2 is a perspective view of a paddle wheel within part of the apparatus.

Figure 3 is a perspective view of part of one form of hollow vessel within which the powder is applied to the material.

Figure 4 is a perspective view of part of another form of hollow vessel within which the powder is applied to the material.

Figure 5 is a diagrammatic representation of air pressure generating and powder mixing apparatus,

Figure 6 is a longitudinal section of a further form of hollow vessel within which the powder is applied,

Figure 7 is a cross-section through the inlet connection of the vessel of Figure 6, while

Figures 8 and 9 are cross-section and longitudinal section respectively of a still further form of construction of the hollow vessel within which the powder is applied.

The apparatus shown in Figure 1 comprises a first hollow vessel 1 within which the powder is applied to the material, and a second hollow vessel 2 within which the powder is stored and in which it is caused to become entrained in a stream of air. One end of the first vessel 1 is connected to the upper part of the second vessel 2 by a pipe 3 in which there is provided a fan 4 which induces the flow of air in the direction of the arrows. The fan may be driven by an electric motor, not shown.

The other end of the first vessel 1 is connected to the upper part of the second vessel 2 by a return pipe 5. Air is therefore caused to circulate continuously through the two vessels. The vessel 2 contains a paddle wheel 6, of the form shown in Figure 2, which dips into powder filling the lower part of the vessel, the powder being carried up by the blades of the wheel, when rotated, for example, by an electric motor, not shown, and as it falls by gravity becomes entrained in the air passing through this vessel.

Seeing that the bottom of the vessel 2 is shaped cylindrically to fit closely around paddle wheel 6, the process continues effectively until the vessel is nearly empty.

The vessel 1, shown also in part in Figure 3, is designed to accommodate extruded material in lengths of various cross-sectional shapes, which are fed in by way of the inlet aperture 7 and out by the outlet aperture 8 as a continuous process. In order to direct the powder laden air away from the apertures and in the direction of movement of the material, tubes 9 and 10 are provided in continuation of the apertures 7 and 8, for a short distance, and each is surrounded by a plenum chamber 11 and 12 respectively, having an annular slot around the inlet and outlet apertures respectively, and facing towards one another.

The space between the tubes is shaped longitudinally to provide a smooth flow of air. The connections of the pipes 3 and 5 are taken to the plenum chambers 11 and 12 respectively. In order that the extruded material may be easily inserted in the vessel 1 the latter may conveniently be divided into two parts longitudinally as shown.

It is preferable to maintain the air in the apparatus at a sub-atmospheric pressure to prevent the exit of the powder laden air by way of the inlet and outlet apertures 7 and 8, and contaminate the air in the environment. In order to accomplish this a fan 13, driven by an electric motor, not shown, is provided, which is connected by the pipe 15, preferably to the inside of a bend, as shown, where the powder tends to flow around the outer part of the pipe, and then passes to atmosphere by way of the air filter 14. The air discharged to atmosphere is therefore innocuous.

The part of the vessel shown in Figure 4 is adapted particularly for use with narrow sheet material, in which the inlet and outlet apertures are in the form of a slot, the margins of which closely follow the cross-sectional shape of the material to prevent undue passage of air therethrough. The inlet and outlet apertures can of course be appropriately shaped to suit materials of other cross-sectional shapes.

When the vessel 1 is required to be positioned close to an extruding nozzle, it may be provided with an air-tight fit and the tube 9 may be dispensed with. The direction of motion of air through the vessel 1 may be in the same direction as the material, as shown in the drawings, but alternatively it may be arranged to move in the opposite direction to the material.

The arrangement shown in Figure 5 is similar to that shown in Figure 1 inasmuch as the second hollow vessel 2 houses a paddle wheel and the air is circulated to the first hollow vessel by means of a fan 4. However, there is mounted above the second vessel the filter 14, from which the powder collected therein may be allowed to fall into the second vessel.

The return pipe 5 from the first hollow vessel in which the powder is applied to the material, is connected to a cyclone filter 16, from which the relatively clean air passes to the filter 14 for a further cleaning before being discharged by the exhaust fan 13 to atmosphere by the exhaust pipe 17. The powder separated by the cyclone 16 is carried by air in the pipe 18 to the second vessel 2. By this means, the powder which is not utilized in vessel 1 is returned automatically to

the vessel 2, and is re-circulated and so long as there is sufficient powder in the latter vessel, the process continues un-interruptedly.

The first hollow vessel shown in Figures 6 and 7 is in the form of a tube 19, having an inlet aperture 7, and outlet aperture 8 for the passage of material 20, which is here shown as an example in the form of a circular rod. The connections 21 for the feed and return pipes are shown in Figure 7, and are annular and progressively diminish in cross-sectional area in a circumferential direction as the air encircles the annular slots 22, thereby to evenly distribute the powder on all sides of the material. The slot in the inlet connection faces radially inwards while the slots in the return connections face axially. In consequence of the vessel being maintained at a sub-atmospheric pressure there is a tendency for air to flow into the vessel by way of the inlet and outlet apertures for the material, thus preventing any escape of powder into the workshop. In the arrangement of Figure 6 therefore the powder is fed in at the centre and is exhausted adjacent the ends of the vessel.

The tubes 9 and 10 correspond to the tubes 9 and 10 of Figure 3, while the tapering connections provide the plenum chambers 11 and 12 of Figure 3. The direction of arrows in Figure 7 indicates a feed connection, while in a return connection the air will naturally flow in the opposite direction.

When the material to be coated is in wide sheets, it is preferred to provide a box-like first hollow vessel constructed as shown in Figures 8 and 9, which has opposite ends 23 and 24 and a top 25. The inlet aperture 7, in the form of a long slot, is in one end of the box and the outlet aperture 8 of the same form is in the other end of the box, both close to the bottom 26. Connections 27 and 28 for the return pipe are made in the top 25 close to the ends.

Connection to the feed pipe is made at one side of the box and the air enters a tapered plenum chamber 29 positioned across the box and the material 20. The plenum chamber has a long narrow slot 30 in the bottom thereof and across which are positioned thin partitions 31, which are vertical, and preferably each has a lip 32, which assists in changing the direction of the air. Also, it is preferred to provide a slot which is narrower at the top where the air enters than it is at the bottom where the air leaves, thus forming a narrow longitudinal slot leading into a wider longitudinal slot therebelow having the partitions.

Owing to the relative positioning of the inlet and exhaust for the air, the powder follows the paths shown by the arrows in Figure 9 and evenly coats the sheet material 20 as it passes through the box.

Although in the embodiments above described fans 4 and 13 are provided to induce the flow of air and to maintain a sub-atmospheric pressure; when, for example, air under pressure is available in the factory where this apparatus is installed, such air pressure may be used to operate the apparatus by way of injection nozzles or other means, thereby avoiding the necessity to provide separate fans for the purpose, and other details for carrying the invention into effect may be varied without departing from the scope of the invention claimed.

WHAT WE CLAIM IS:—

1. Apparatus for dusting tacky material comprising a first hollow vessel having an inlet aperture and an outlet aperture at opposite ends thereof for the passage therethrough of the material to be treated, a second hollow vessel connected from the upper part thereof by flow and return pipes to different parts of said first hollow vessel, means which induces a flow of air through the said pipes between the vessels, and elevator means within the second hollow vessel to raise powder in the vessel and allow it to fall so as to become entrained in the air passing through the said second hollow vessel.

2. Apparatus as claimed in claim 1 in which in the first hollow vessel a connection of the flow pipe is made adjacent the inlet aperture and the connection of the return pipe is made adjacent the outlet aperture.

3. Apparatus as claimed in claim 2 in which the connections of the flow and return pipes to the first hollow vessel are each in the form of an annular slot around the inlet and outlet apertures respectively and face towards one another.

4. Apparatus as claimed in claim 1 in which in the first hollow vessel a connection of the return pipe is made in the vicinity of each of the apertures and a connection of the flow pipe is made to the vessel intermediate the apertures.

5. Apparatus as claimed in claim 4 in which the connection of the flow and return pipes to the first hollow vessel are each in the form of an annular slot encircling the path followed by the material as it passes through the vessel.

6. Apparatus as claimed in Claim 3 or 5 in which the flow and return pipes are each connected to their respective slots by way of an annular hollow channel which progressively diminishes in cross-sectional area in a circumferential direction and is co-axial with the respective annular slot.

7. Apparatus as claimed in Claims 1 and 4 in which the first hollow vessel is in the form of a box, the inlet and outlet apertures are in opposite ends of the box and adjacent the bottom thereof, the connections of the return pipe are in the top of the box adjacent the said ends, and the connection of the flow

pipe is in one side of the box intermediate the ends and leads to a slotted distributor positioned between the sides of the box and across the path followed by the material, and having an outlet facing towards the bottom of the box and above the material passing through the box.

8. Apparatus as claimed in Claim 7 in which the slotted distributor comprises a hollow channel with progressively decreasing cross-sectional area in the direction away from the inlet connection and has in the lower side thereof a longitudinal slot leading into a wider longitudinal slot therebelow and having equally spaced partitions across the lower slot to direct the flow of air downwards onto the material.

9. Apparatus as claimed in Claim 1 in which the pressure in the said first hollow vessel is maintained at a sub-atmospheric pressure and air is exhausted from the apparatus by way of an air filter.

10. Apparatus as claimed in Claim 1 in which the elevator means is a paddle wheel.

11. Apparatus as claimed in claim 1 in which the inlet and outlet apertures of the first hollow vessel are provided with inwardly directed sleeves each surrounded by a plenum chamber.

12. Apparatus for dusting tacky material substantially as hereinbefore described with reference to and as shown in Figure 1 and 2 and in Figure 3 or 4 of the drawings accompanying the Provisional Specification.

13. Apparatus for dusting tacky material substantially as hereinbefore described with reference to and as shown in Figure 5 and Figures 6 and 7 or 8 and 9 of the drawings accompanying the Complete Specification.

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Agents for the Applicants.

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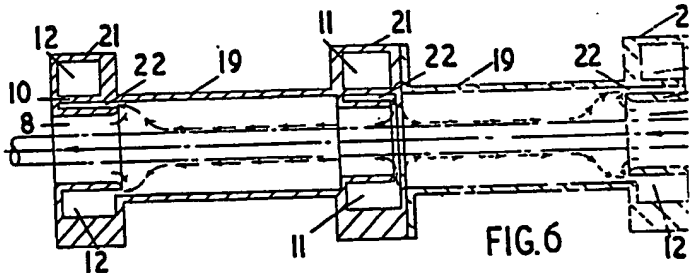

FIG.6

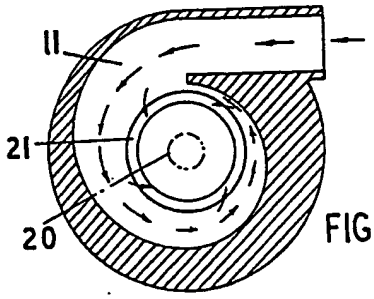

FIG.7

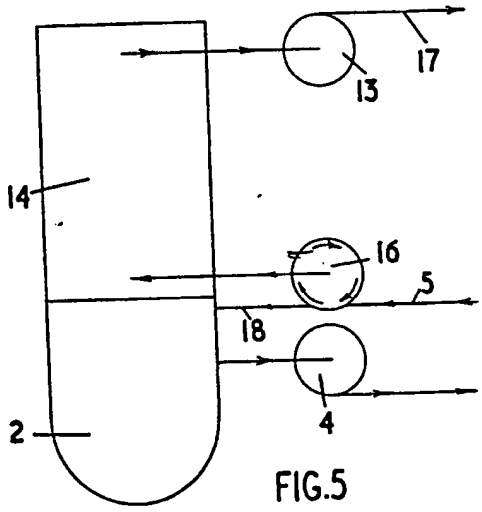

FIG.5

1134069 COMPLETE SPECIFICATION
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Sheets 1 & 2

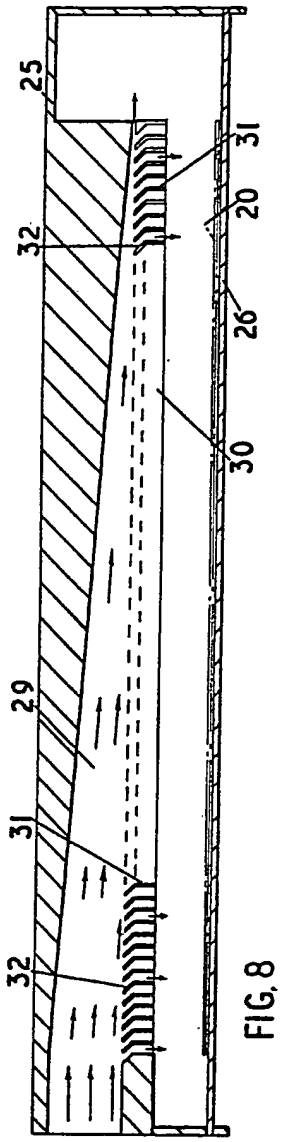

FIG. 8

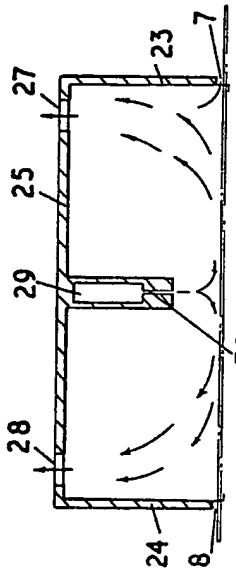

FIG. 9

1134069 COMPLETE SPECIFICATION
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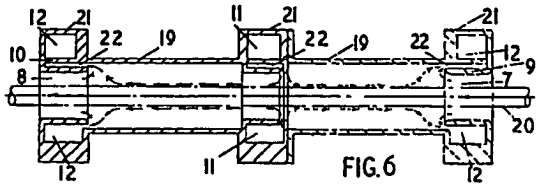

FIG.6

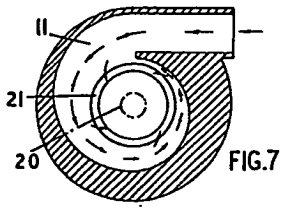

FIG.7

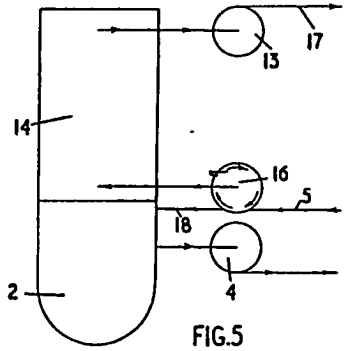

FIG.5

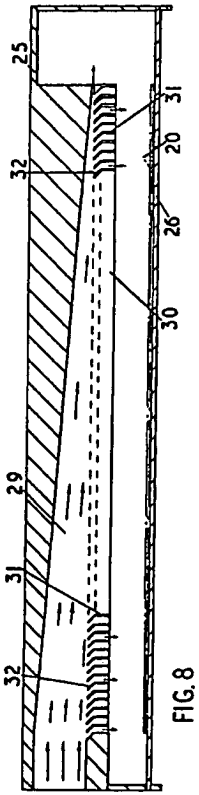

FIG.8

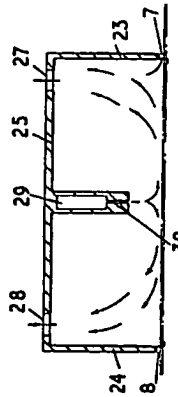

FIG. 9

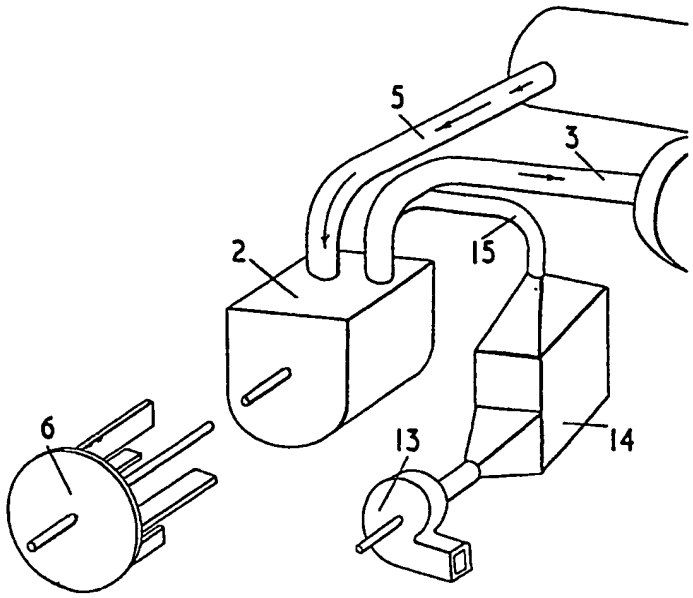

FIG. 2

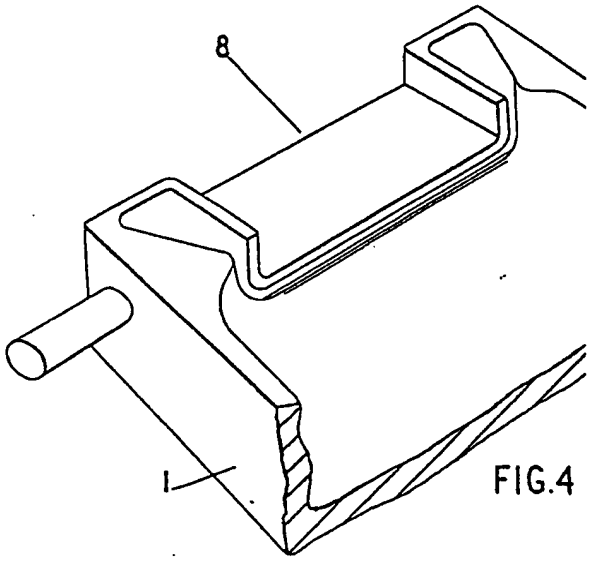

FIG.4

1134069 PROVISIONAL SPECIFICATION
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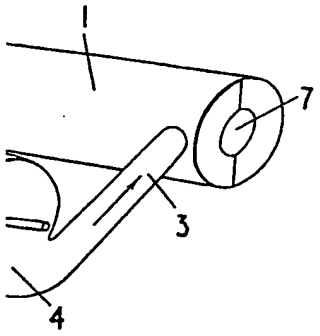

FIG.1

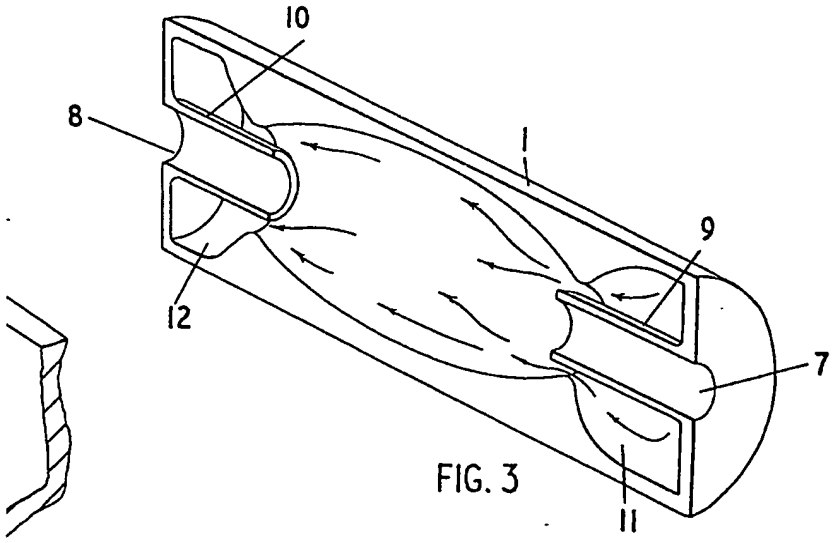

FIG. 3

1134069 PROVISIONAL SPECIFICATION
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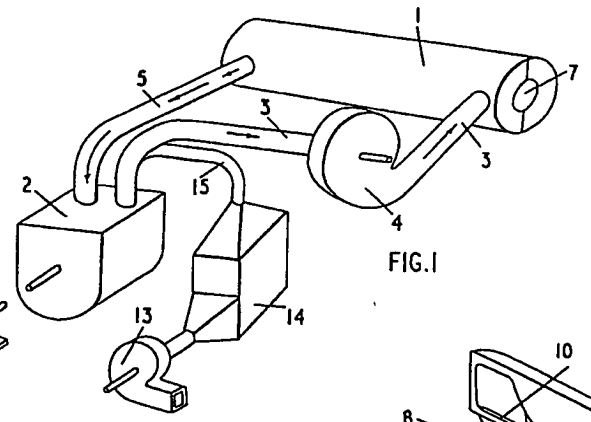

FIG. 1

FIG. 2

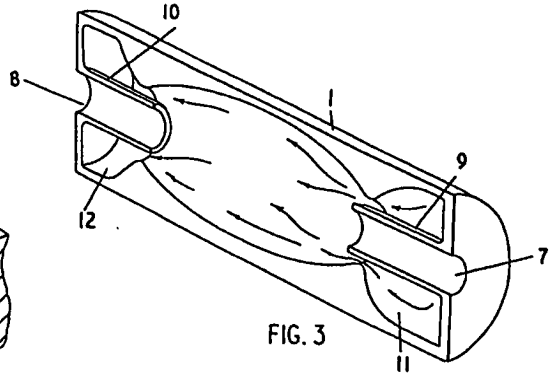

FIG. 3

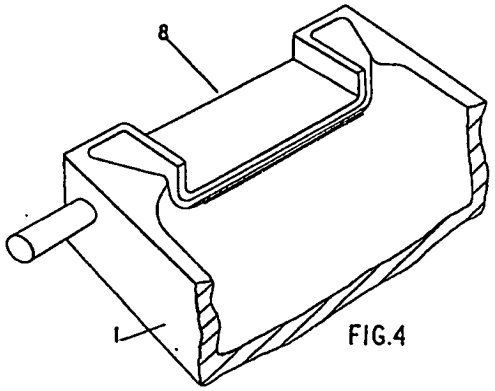

FIG. 4